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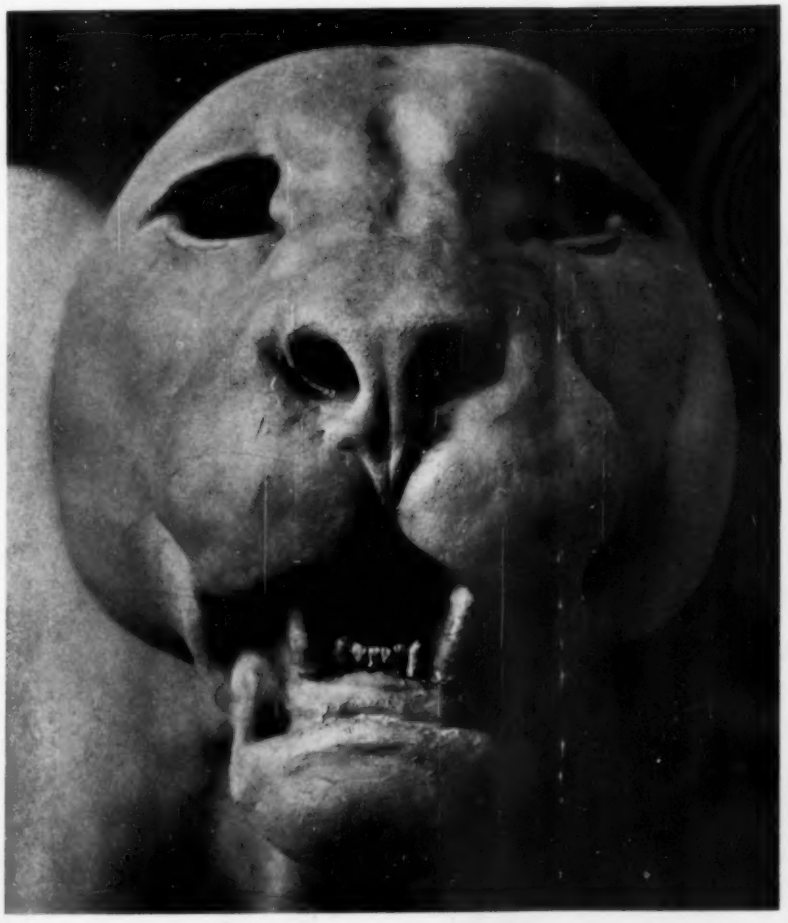
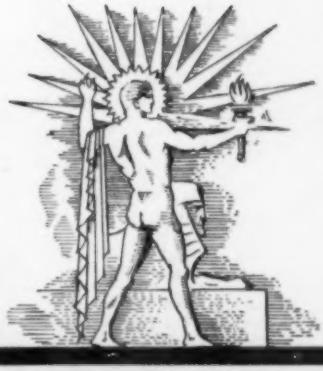
SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE •





SEPTEMBER 7, 1935

Foundation For a Lion

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The Weekly Summary of Current Science

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DO YOU KNOW?

The City of London has a five-year plan for improving its transportation system.

Fossil remains show that there were frogs on earth at least 200 million years ago.

Salt is now used in a compound preventing ice formation on highway surfaces.

The potato owes its popularity, says one nutrition specialist, to the fact that it has no pronounced flavor.

Rabbits were introduced into Australia for hunters' sport less than a century ago; but the animals increased so alarmingly that it became necessary to pay men to kill them off as pests.

Puerto Rico may decide to eliminate cotton, cultivated and wild, from its fields, in order to reduce insect pests that infest cotton and other plants.

Pumpkins and squashes cannot be crossed with melons.

The Egyptians made tools of meteoric iron as early as 3000 B.C.

Heavy duty tires for army trucks have sponge rubber fillers instead of inner tubes.

Night traffic accidents indicate that the hazard per car is four times as great by night as by day.

The gondola of Prof. Piccard's balloon in which he rose over 10 miles, in 1932, has been presented to the Science Museum at South Kensington, England.

An almost forgotten episode in bicycle history is an invention of a bicycle by a Russian serf named Artamonov, who displayed his bicycle by command on the coronation day of Alexander the First, in 1801, and was rewarded by being freed from serfdom.

WITH THE SCIENCES THIS WEEK

Most articles are based on communications to Science Service or papers before meetings, but where published sources are used they are referred to in the article.

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MEDICINE

Capsule Before Breakfast Gives Immunity to Colds

HALF as many colds during the winter, or even less, as a result of a capsule taken before breakfast. It sounds like a dream or a patent medicine advertisement.

The dream came true, however, for several hundred persons who were the human guinea pigs in the common cold research of Drs. George E. Rockwell and Hermann C. Van Kirk of the University of Cincinnati and Dr. H. M. Powell of the Lilly Research Laboratories, Indianapolis (*Science*, Aug. 23).

The capsules contained measured amounts of cold vaccine made of pneumococci, an influenza organism, streptococci and another organism found in the nose and throat and known to scientists as *M. catarrhalis*. The capsules were taken with half a glass of cold water half an hour before breakfast. One capsule was taken each morning for a week and thereafter one or two were taken each week throughout the season.

Of the 445 persons taking the vaccine, 399 had 1,089 fewer colds this year than usual, the scientists report. This is a 70 per cent. decrease. The 469 controls, who did not take the vaccine, showed a decrease of only 299 colds during the year, or slightly more than 26 per cent. decrease.

"An essential decrease of 43.7 per cent." is the way the scientists put it. Looking at the figures in their tables, it appears that whereas the subjects of the experiment usually had about four colds a year, each had only about one the year the vaccine was taken. Getting away from figures, the scientists report that nearly all those taking the vaccine said they were "greatly benefited" by it.

Another group studied consisted of 46 persons who had suffered from practically continuous colds. Of these, 43 suffered from less than one cold per person during the season in which they were given the vaccine.

Part of the success is ascribed by the scientists to the make-up of the vaccine, that is, to the kinds and proportions of different "germs" in it. Another advantage was considered to be the fact that the vaccine could be taken by mouth. As a result it was easier to give it at the frequent intervals which are necessary in order to get the best results. This is because immunity or resistance to the bacteria of nose and throat infections does not last long and must be renewed by frequent doses of vaccine.

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COMMEMORATING A CONGRESS

Commemorating the Fifteenth International Physiological Congress recently held in Leningrad and Moscow, a bas-relief medal portraying I. M. Sechenov, founder of Russian physiology, was struck by the Soviet Mint.

MEDICINE

Cancer Experts Warn Against Hope From Lead Treatment

WARNING against entertaining hope for the successful treatment of cancer by lead has been issued by the Memorial Hospital for the Treatment of Cancer and Allied Diseases, New York City.

The warning was given by the experts on the staff of this cancer hospital following reports from the American Chemical Society meeting in San Francisco of improved technic in utilizing lead for cancer treatment. (*SNL*, Aug. 31).

The reports were "received with scepticism and regret" at Memorial Hospital where lead treatment was given an extensive trial and then abandoned because the general poisonous effects of lead were found too severe.

"No method of combatting the chronic toxic effects of lead has been found," says the statement issued by the hospital.

"Neither lead, nor any heavy metal, has any special affinity for tumor tissues. Lead deposits, especially in the liver and bones, exert anemic effects for a long time afterwards.

"No new results of newer lead therapy methods seem to justify raising new hopes that lead will prove a desirable method of treating advanced cancer."

Dr. Bradley L. Coley especially, from personal experience, endorsed this view.

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MEDICINE

Extract of Maternal Tissue Successful Against Measles

NO SUITABLE measure for dealing with the most infectious of all childhood diseases — measles — had been found until recent experiments with a protein material obtained from the bodies of human mothers have been reported.

Newborn babies do not have measles, but the immunity, evidently derived from their mothers, disappears very early. Measles and the complications that follow it are then acknowledged as among the most dangerous of all diseases of infancy and early childhood.

Encouraging evidence regarding the new treatment reaches the medical world through the *Journal of the American Medical Association* (Aug. 17). The medical publication devotes a major article, a scientific report from its council on pharmacy and chemistry, and an editorial to this important new preparation.

Dr. Irving W. Levitas, a specialist in children's diseases, Westwood, N. J., describes twenty-eight cases of fully developed measles treated with the new substance. Of these twenty-five children were greatly benefitted, particularly in regard to cough and toxicity.

When Dr. Levitas gave the new treatment to eighteen other children one or two days after they were exposed to measles, he was able to modify the course of the disease so that in fifteen cases the symptoms were extremely mild.

Then the substance, in larger dosage, was given to twelve children exposed to the measles in a hospital ward. After the injection of the substance, none of them "took" the disease.

In a preliminary report, the council of pharmacy and chemistry of the American Medical Association considers the new substance, which is a placental extract first used experimentally by Dr. C. H. McKann and his co-workers. It regards the product as a promising immunizing agent. Both the council and the journal editor, however, think it to early for doctors to put the extract into general use, until further evidence of its value is available.

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PUBLIC HEALTH

Education of Dog Owners Urged as Rabies Preventive

Tendency of Dogs to Bite Varies With Breed; Dogs Bite More Frequently in June Than in "Dog Days"

EDUCATION of dog owners and adequate penalization of owners of biting dogs are important measures for the prevention of rabies, in the opinion of Dr. Robert Olesen, U. S. Public Health Service medical director. Dr. Olesen states these opinions in a report on the control of rabies in New York City.

June, contrary to general opinion, is the number of greatest animal bites in New York City. Animal bites are fewer in the so-called dog-days of July and August, than in May and June.

Some breeds of dogs bite more frequently than others, it appears. Dr. Olesen tentatively lists dog breeds, in order of greatest frequency of bites as follows: German police, chow, poodle, Italian bull, fox terrier (crossed), chow (crossed), airedale, pekinese, German police (crossed).

While this is the order of frequency according to the records in New York City, Dr. Olesen pointed out that popularity of a given breed, for example, which would make many such dogs present in a given community, might affect the listing. Training and environment of dogs undoubtedly plays a considerable part in the infliction of bites and these factors should also be considered, in listing frequency of bites according to breed.

Prevention of rabies by vaccinating the dogs in the community is not practical at present. Anti-rabic vaccination is still in the experimental stage. It should therefore not be relied on, although it is hoped that a successful anti-rabic vaccine will be developed in the future.

Instead Dr. Oleson recommends "Increasingly effective application of such obviously practical methods of licensing, quarantining and the destroying of stray animals."

While he approves thoroughly of such measures as control and observation of the biting animal and Pasteur treatment of the bitten person, Dr. Olesen believes that in addition public health officials should emphasize the need for discrimination in the selection, training, and care of dogs. He suggests decreasing the dog population by weeding out the unfit. Surely animals, unable to distinguish between friend and foe, and vicious animals should be destroyed.

"If dogs were given reasonable consideration and care, as befits their peculiarities when living in close proximity to human beings, it is conceivable that bites would be fewer," he suggests.

Putting the responsibility for preventing dog bites on the owner with adequate penalties for bites inflicted by his animal, should materially reduce the occurrence both of dog bites and of rabies, in Dr. Olesen's opinion.

Rabies prevention costs the city of New York approximately $100,000 annually. Unlike many other communities, this city does not derive any income from dog licenses. This income goes instead to the American Society for the Prevention of Cruelty to Animals. The society's animal shelters, however, are available for the observation of dogs that have bitten.

The cost of preventing human and canine rabies Dr. Olesen thinks should be borne by dog owners rather than by the city. He also believes that each person bitten, whether the bite is provoked or unprovoked, should be compensated for his pain, fright, torn clothing and medical expenses.

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Tuberculosis takes its heaviest toll between the ages of 15 and 45.

ZOOLOGY

Dog, Hero of Research, Honored by Monument

HONORING the dog, so often the hero and invaluable aid of medical research, a bronze monument will be erected on the grounds of the All-Union Institute of Experimental Medicine at Leningrad.

The Monument to the Dog, as it is to be called, will be erected at the suggestion of Academician I. Pavlov, whose famous discoveries in physiology were made by means of studies with dogs.

The monument is to be a bronze image of a sitting dog on a pedestal. Bas-reliefs on all four sides of the pedestal will depict separate moments from the life of the dog at Pavlov's laboratory.

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ASTRONOMY

New Comet Found During Search for Minor Planets

THE heavens' newest comet, the second to be discovered by and be named after Prof. G. Van Biesbroeck of Yerkes Observatory, consists of a star-like nucleus surrounded by a round nebulosity, without any tail.

Prof. Van Biesbroeck found it on photographic plates exposed with the Yerkes 24-inch reflecting telescope while studying asteroids or minor planets. He then spotted the new comet in the 40-inch telescope.

Several known comets have also been rediscovered by Prof. Van Biesbroeck in past years.

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GENETICS

Moth Pest of Beehives Found Scientifically Useful

BEE MOTHS, which are a destructive pest in beehives and are hated by all beekeepers, have found scientific usefulness in the zoology laboratory of the College of the Ozarks, Clarksville, Mo. Prof. T. L. Smith of that institution demonstrated before fellow-scientists at the summer meeting of the Genetics Society of America, the results of breeding experiments illustrating certain principles of genetics.

Prof. Smith chose the moth, he said, because it is easily handled under laboratory conditions and is a prolific breeder. He used a wild strain, and has carried it through several generations.

Among the most curious of the progeny that came from these carefully watched

moth nurseries are insects that are half male and half female, called "gynandromorphs" by scientists. Others are not sharply divided into male and female halves, but have male and female markings and form-characters scattered in a "mosaic" pattern over their bodies.

If unmated female moths are kept isolated, about ten per cent. of them are still able to lay fertile eggs, though the proportion of these is very low when compared with the eggs from mated females, and they take much longer to hatch than do normally produced eggs. However, the resulting offspring are of both sexes and apparently quite normal in every respect.

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GENETICS

Injected Sex Hormones Influence Glands of Embryos

MALE SEX glands of unhatched chicks were caused to develop decidedly female characters by injecting the female sex hormone substances theelin and theelol through the eggshells, in experiments reported before the meeting of the Genetics Society of America. The research was carried on by Dr. B. H. Willier of the University of Rochester and Drs. T. F. Gallagher and F. C. Koch of the University of Chicago.

The theelin and theelol were injected in rather heavy quantities. From day to day, eggs were removed from the incubator, opened, and the developing embryos dissected. The ovaries of the chicks that would have grown up to be hens were not affected. Neither were the left sex glands of the chicks that might have been roosters. But the right sex glands developed, surrounding their characteristic male tissues, other tissues just as characteristically female. The glands were halfway turned into ovaries. Even their general shape was changed in a female direction.

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SEISMOLOGY

Earthquake Strikes Baffin Bay Region

BAFFIN Bay was rocked by an earthquake on Aug. 22, reports from St. Louis University indicate.

Calculation of the epicenter shows the point on the earth's surface directly above the shock was in latitude 73.7 degrees north and longitude 64.2 west. The time when the quake occurred beneath the surface was at 20 hours 30 minutes and 43 seconds Greenwich standard time.

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GENETICS

Genes Have Double Function: Vital as Well as Hereditary

Genetics Conference at Woods Hole Brings Out Many New Facts and Viewpoints on Nature and Activities of Units

GENES, the invisible units of heredity, do double duty. They determine the expression of the body's thousands of characters, such as color of hair or eyes, and they also serve a general purpose in merely keeping you alive. If every gene needed for every special purpose were not also present in every cell, even in places where it is not needed, you would not be alive at all.

This double function of genes was brought out in discussion by Dr. M. Demerec of the Carnegie Institution of Washington, speaking at the meeting of the Genetics Society of America, held at Woods Hole, Mass.

Every cell in the body contains exactly the same set of genes as every other set. The cells in your toes have the same hair-color genes as the cells on the top of your head. But just because you have no hair on your toes is no indication that those particular genes are lacking there. If they were not present the cells themselves would not exist. There would not be any toes. There would not even be any *you*. And so for all the rest of the genes everywhere.

The discussion was conducted in an endeavor to find out more about the working of genes—how they operate to make our hair blond or brunette, our eyes blue or brown, our legs long or short, our dispositions placid or vehement. Genetics thus met embryology.

Genes act like enzymes, which are chemical agents that change things without themselves being changed. The digestive ferment pepsin is an example of an enzyme.

But genes are not enzymes, chemically speaking, most of the speakers contended. They are much more complex in their makeup and they increase and multiply themselves, which ordinary enzymes are unable to do. It is considered more likely that they create special enzymes and work through them to produce their effects on body development.

Dr. Calvin Bridges of the Carnegie Institution of Washington displayed

ARCHAEOLOGY

Assyrian Sculpture in Boston Shows Pollination of Date

POLLINATING date trees by hand, to insure a good crop, was practised many centuries ago by the ancient Assyrians. So important was the process in the food economy of the land that it came to have a very high religious significance, as is strongly brought out by a newly acquired sculptured panel just placed on display at the Museum of Fine Arts at Boston, Mass.

The great stone panel, which used to adorn the walls of Ashur-nasir-pal IV, king of Assyria from 885 to 860 B.C., shows a winged god holding a bucket in one hand, while with the other he thrusts the cone of the male date tree among the flowers of a female tree, thus pollinating them.

Among the ancient Assyrians as among the modern Arabs of the same land, the date palm was literally a tree of life, for its fruit was used, not as a delicacy, but as a staple food like bread. It was therefore not beneath the dignity even of a god to insure its abundant yield.

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DIVINITY AS TREE TENDER

microscope slides showing the interior of cell nuclei, in illustration of the way in which genes not only reproduce themselves but also may produce entirely new genes. Dr. Bridges has suggested that evolution began with a single gene, and that this, by multiplication and changes in its chemical nature, eventually gave rise to the thousands of diverse genes found in the most advanced animals and plants. These changes may have come about through the impact of radium rays or other active forces of nature.

Dr. Charles B. Davenport of the Carnegie Institution of Washington showed a number of large-scale charts of living cells, showing changes in material lying directly on the outside of the nuclei. These, he suggested, indicate how the genes determine the course of bodily development.

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AGRONOMY

Plants' "Uplifting" Tendencies Affect Character of Soil

PLANTS, constantly sucking upward the water that trickles and oozes downward through the ground, profoundly affect the character of the soil in which they grow, Sir E. John Russell, director of the Rothamsted Experimental Station at Harpenden, England, told fellow-agronomists at the Amsterdam meeting of the Sixth International Botanical Congress.

In the eastern part of England the water drainage through cultivated soils is only about one-half that through uncultivated soils, he said. The whole nature of the soil is affected, and the marked differences between feebly and strongly leached-out soils turn very largely on the intensity of action of plant roots in removing the soil water.

"Associated with this removal of water is also a transfer of mineral substances and nitrates from the subsoil to the aerial parts of the plant," Sir John continued. "Calcium, potassium and silica in particular are lifted in quantity to the leaves and stems: when the plants die they fall back on the surface of the soil. The details vary with individual plants, and in the end striking differences may result.

"The general result is, however, that this process counteracts the washing down by the rainfall, and it confers upon the soils of mild humid countries one of their characteristic properties that the upper layer tends to be richer in calcium and potassium and to be more nearly neutral, than the lower layers. These characters are of profound ecological significance and react greatly upon the vegetation."

The plant roots evolve considerable amounts of carbonic acid, the speaker pointed out. This evolution of carbon dioxide is of special importance in dry regions where soils tend to be alkaline, for it offers the possibility of reducing the alkalinity and so profoundly changing the vegetation. Experiments are being tried in various regions to find crops which by evolving large amounts of carbon dioxide from their roots, can be used for the reclamation of alkali soils.

Plants also exercise marked influence on each other through their roots, Sir John declared. The legumes, or plants of the pea-bean-clover family, not only obtain nitrogen for their own needs through the activities of the bacteria that live in their root nodules, but also excrete it and make it available for other plants.

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GENETICS

Effects of X-Raying Show In Later Generations

X-RAYING plants to produce hereditary changes in their offspring is not limited in its effects to what happens in the immediate outcome. An X-rayed plant may produce offspring with new peculiarities, such as changed leaf-size or flower-color, which will duly appear in subsequent generations. But these generations may also begin to produce other changes, even without being X-rayed themselves.

Changes of this character, and an explanation for them, were described before the meeting of the Sixth International Botanical Congress, by Prof. T. H. Goodspeed of the University of California, one of the pioneers in the field of X-ray genetics. While the details of the process are highly technical, the essential fact underlying the three types of cellular change he described is a state of instability, of continuing change, induced in the chromosomes by the first impact of the X-ray bombardment. In effect, the X-rays having cracked the shell, all sorts of things may continue to pop out for a long time to come.

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FORESTRY

Forest Fire Renders Soil More Liable to Erosion

SOIL conservation and forest conservation, two national problems of which the American public is now most acutely aware, meet and intensify each other when fire sweeps a forest. Not only does a treasure in timber vanish upward in smoke, but an even greater treasure, the forest soil itself, vanishes downward through erosion.

How bad the erosional after-effects of forest fire can be is related by Charles A. Connaughton of the U. S. Forest Service (*Journal of Forestry*, August). Mr. Connaughton studied well over three thousand test plots in burnt-over forest land, comprising both cut-over areas and virgin timber.

In general, the more severe the fire, the more severe also was the subsequent erosion. On the steeper lands, lightly burned areas, on which the fire took only the top layer of the forest floor litter showed relatively little erosion. Only about ten per cent. of such plots were eroded. But when the fire had been really severe, as high as 80 per cent. of the plots showed erosion.

Less Damage in Virgin Timber

Fire brings more erosional damage to cutover land than to virgin timber, the studies showed. While the worst damage on the steepest land was not greatly different in the two classes, there was a wide spread between post-fire erosion in cutover and virgin sites where the fires had brought only partial destruction, leaving the living trees and most of the underbursh still able to hold the soil with the myriad fingers of their roots. Taking a sweeping average of Mr. Connaughton's figures, a fire short of complete destruction in virgin timber is followed by only about half as much soil erosion as a fire of the same grade in the second growth on cutover land.

Of course, where soil is eroded away from a burnt-over forest site, it is difficult to make trees grow there again—impossible, if the erosion is severe enough to lay bare the underlying rock. But the damage is apt to be felt by people who never see or think about the forests. Hundreds of miles away, the freshets that gush through the erosion gullies accumulate as floods in the greater rivers, piling out of their banks to wreak destruction, and leaving behind them, on lowland farms and industrial areas, burdens of silt that should still be up in the hills, growing trees.

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PLANT SOCIOLOGY

Sociology of American Plant Life Described

SOCIOLOGY of American plant life in prairies, forests and mountains, was described before an audience of European botanists by one of their American colleagues, Prof. H. S. Conard of Grinnell College, who spoke at the meeting of the Sixth International Botanical Congress at Amsterdam.

In America, as everywhere in the world, regional differences in climate, soil and other conditions find expression quite as much in plant communities as they do in the cities and states of human beings. Long grass is as natural to Iowa-Nebraska prairies as are farmers raising corn and hogs. Short grass belongs to Montana and Wyoming quite as inevitably as cattlemen. Beech-maple-hemlock forests are as true a sociological expression of Michigan and northern Ohio as are automobile and tire manufacturers.

But these plant societies are no more completely uniform than are human societies. There are plenty of local and even individual differences within the broad frame of a general regional type. Groves of bur oak are as truly a part of the prairies as are the wider stretches of long grass, and in the Eastern forests one will find plenty of places where the dominating trees give way to such things as white pines or tulip trees.

Many Unaccountable Strangers

Moreover, there are plenty of "strangers" that get into seemingly unaccountable places. Thus, far up into the prairies you can find such trees as the Kentucky coffee tree, as obvious and outstanding a Southeasterner as a gentleman from the Kentucky hills would be in Cedar Rapids or Omaha. Or, on Hempstead Plain on Long Island, you will find wild grasses, legumes and other plants that are so atmospherically "Western" that you almost expect to see a man with leather chaps and a three-gallon Stetson standing among them.

Such seeming aliens can usually be accounted for if you look acutely enough for causes, Prof. Conard pointed out. The plants from the Southeast that have wandered far out into the prairies have followed the moist, rich, sheltered lands that line the stream courses. Such plants are fairly common in the eastern prairies of Illinois and eastern Iowa; in western Iowa and central Nebraska they become rare. The "Westerns" that crop up in the East are usually found on extremely porous soil, which permits the heavier rains of the region to drain right through, producing a set of moisture conditions resembling those of the drier prairies or even the plains.

One should not speak of these local "foreign" plant societies as "detached fragments" of East or West, standing like islands in a strange country, Dr. Conard contended. They should be frankly recognized as outliers, as true foreigners, which have kept their own identity but which do not really color the communities into which they have for one reason or another found their way.

Great Britain's Unique Vegetation

Great Britain presents a peculiar picture to the student of plant life: a relatively limited assortment of plant species, but a wide variety of climatic and soil conditions, Prof. A. S. Watt of Cambridge University explained to his fellow-students at the same session of the Congress.

These circumstances give rise to some rather unique situations, Prof. Watt pointed out. Since there are fewer plant species, there is a tendency for each one to spread out more. In other lands, especially in the botanically rich North American region, keen competition between species holds each one very close to the habitat it can occupy to the very best advantage. In Great Britain, on the contrary, each species tends to be limited only by climatic and soil conditions, rather than by the competition of its fellow-plants.

The great variety of British climate, in a comparatively small area, has brought into close contact species usually thought of as belonging to widely separated regions. In the British Isles plants of Mediterranean affinities rub elbows with almost-Arctic species, and plants that thrive best in damp island climates are found growing close to others that are more characteristic of drier inland countries. The sharp contrast between the soil types of western and eastern parts of the islands tends to accentuate the effects of the climate.

Prof. J. Braun-Blanquet of the University of Montpellier, France, compared the principal vegetational types of northwestern Europe with those of northeastern North America. He found striking resemblances between the two regions, both in the kinds of plants that inhabit them and in the soil types on which the vegetations grow.

Science News Letter, September 7, 1935

SOIL SCIENCE

Humus Formation in Soil Influenced by Many Factors

YOUNG plants, cut down and buried in the soil as fertilizer, decay much more quickly than older plants of the same kinds do. This was one of the points discussed in a paper presented before the meeting of the Sixth International Botanical Congress by Dr. Selman A. Waksman of the New Jersey Agricultural Experiment Station.

In the experiments described by Dr. Waksman, a number of plants were cut at different stages of growth and definite amounts allowed to undergo decomposition by microorganisms, under identical conditions. Of the young plants, 73 per cent. of their material was decomposed in 30 days, while it took twice as long as that to decompose only 42 per cent. of the material of older plants.

One of the reasons for the difference in decomposition rate, Dr. Waksman pointed out, is the marked difference in the chemical makeup of older and younger plants. The older plants contain higher proportions of more resistant materials, especially the celluloses and lignins. The latter substances, which are the basis of the "woodiness" of wood, are exceedingly difficult for bacteria, fungi and other microorganisms to digest. Moreover, there is a difference between the lignins of old and young plants; in the younger stages the lignins are chemically "tenderer" and easier to break down.

Varied Organisms of Decay

Differences in humus formation in the soil are traceable not only to differences in the plant materials that are decomposed but also in the living agents of decay, the bacteria, molds, protozoa and other microscopic forms, as well as the insects, worms and other larger animals that feed on dead wood and leaves, chewing them into more manageable morsels for the smaller creatures.

The relative abundance of these is influenced partly by the nature of the dead plant materials themselves, for some of them like wood, others straw, still others dead leaves; and also by such factors as temperature, moisture, soil ventilation and soil acidity or alkalinity.

Science News Letter, September 7, 1935

CHEMISTRY

Crotyl Alcohol, Once Rarity, Now Produced at Low Cost

CROTYL alcohol, a compound of great usefulness in research in both medical and industrial chemistry, is now available in pure form at a low price. Hitherto investigation of the possible value of its derivatives has been hampered by its prohibitively high price and also by the impure form in which it has been obtained.

The process of making this hitherto rare alcohol pure, cheap and abundant was described before the meeting of the American Chemical Society by Drs. William G. Young, Walter H. Hartung and Frank S. Crossley of the University of California at Los Angeles.

An impure form of crotyl alcohol has been in use for some time but it has not yielded dependable results and it has been relatively difficult to produce. In the method worked out in the Los Angeles laboratory, it is derived from crotonic aldehyde; which in turn is produced from acetylene. The new method produces four times as much of the pure crotyl alcohol as the old method could obtain of the impure product.

Science News Letter, September 7, 1935

EDUCATION—MEDICINE

Standards of Medical Education Growing Lax

DEPLORABLE conditions that prevailed in medical education thirty years ago again threaten this country, unless doctors, educators, state boards of examiners and public authorities combat present tendencies.

The American Medical Association issues this warning in the current issue of its *Journal* (Aug. 31), along with the annual presentation of medical education data for the United States and Canada. Fifty pages are given over to this report of its council on medical education and hospitals.

Financial stringency in recent years has caused some medical schools to rely more largely on income from student fees. Thus, larger numbers of students have been accepted for the money they will bring in, the medical journal explains.

Unfortunately, in most instances the teaching staff has not been correspondingly strengthened or the physical plant commensurately enlarged, it is pointed out.

More alarming to the American Medical Association than undermanned faculties and overcrowded laboratories is the failure of some schools to maintain high academic standards in the selection of students. Too many applicants with poor scholastic records are being accepted, the *Journal* charges, with the inevitable impairment of school efficiency.

Thirty years ago there were 160 medical schools in the United States with an enrollment of 26,147 students. The American Medical Association sprang into action with its council on medical education. The Carnegie Foundation for the Advancement of Teaching helped out with its publicity. Ten years later the number of schools had been reduced to 96 and the enrollment to 14,891.

Now in 1935 there are again some 23,000 medical students. Medical schools still are fewer and better, but the factors that caused the deplorable conditions of a generation ago are again at work, a *Journal* editorial points out, and history is repeating itself.

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PLANT PATHOLOGY

Plant Disease Fungi Have Diseases of Their Own

FARMERS of the future may fight diseases that now devastate their crops by sowing or spraying the germs of counter-diseases, to kill the pestiferous fungi. This possibility was suggested by a number of reports presented before the meeting of the Sixth International Botanical Congress at Amsterdam.

The suggestions came from research laboratories in widely separated parts of the world. Dr. S. D. Garrett of the University of London, who carried on his studies in Australia on a terribly destructive wheat disease called "take-all," found in certain types of soils a complex of fungi and other obscure organisms that are distinctly unfriendly to the cause of "take-all." From the University Farm, St. Paul, Minn., Miss Delia E. Johnson reported the antagonism of a newly discovered species of bacterium against the smut diseases of corn and various small grains.

A most comprehensive study in the field of microbiological antagonisms was presented by Prof. S. Endô of the University of Tokyo. He has examined dozens of kinds of bacteria and molds for their effects on several different disease-causing microorganisms. Some he has found to to be decidedly depressing, others less so; a fair number completely lethal.

It may be that bacteriologists and plant pathologists are ready to take a leaf out of the book of the entomologists, who long ago learned to fight enemy insects by turning their own insect enemies loose upon them.

Science News Letter, September 7, 1935

IN SCIEN

BOTANY

Mountains in Sahara Desert Support Growth of Trees

MOUNTAINS in mid-Sahara are not the sun-baked piles of barren rock which popular imagination, fed by Hollywood versions of the Foreign Legion, has pictured them. They manage somehow to gather enough moisture to support vegetation, even a growth of trees.

At the meeting of the Sixth International Botanical Congress, Prof. René Maire of the University of Algiers told of his explorations in what is probably the least-known botanical region of the world, the high mountains of central and southern Sahara, which rise to heights of 6,500 to 10,000 feet.

Earlier travelers' tales had clothed them with "forests" of pistachio and cypress pine, trees unknown in the New World. Under the more critical botanical eye of Prof. Maire, these forests dwindled to a thinner growth, mostly of pistachio and a kind of desert cypress. He did not deny, however, that denser forest growth may once have existed there, in a bygone age when the Sahara itself was a grassland instead of a desert.

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BOTANY

Ancient Flowers Had Sexes Widely Separated

FLOWERS of the most familiar modern plants have male and female parts —pollen-yielding and seed-forming organs—close together. Lilies, apple-blossoms and buttercups are common examples.

But it was not so in the most primitive flowers, some tens of millions of years ago, Prof. H. Hamshaw Thomas of Cambridge University, declared in an address before the Sixth International Botanical Congress. These earliest flowering plants kept their sexes carefully segregated, as they still are in some modern species, such as pines and willows.

Evidence from fossils and from the study of modern floral structures tends to indicate that the earliest flowers consisted of whorls of structures bearing the reproductive elements, each whorl tipping the end of a branch,

Science News Letter, September 7, 1935

FIELDS

GENETICS

Transplanted Eyes Aid in Genetics Research

WITH an eye growing on the side of its abdomen, a tiny insect no bigger than a gnat attracted much attention at the Woods Hole meeting of the Genetics Society of America.

The insect, a drosophila or fruit fly, was brought back from France, where the exceedingly delicate operation was performed by Boris Ephrussi and G. W. Beadle of transplanting an eye almost too small to be seen without a microscope. The eye was transplanted while the insect was still a grub or larva, and it grew up to perfect adulthood with the added organ still in place. The eye transplant was made for the purpose of studying problems in the development of hereditary characters. Two kinds of fruit-flies were used; one was the ordinary wild type, with brown eyes. The other was a specially bred type, with vermilion eyes. Cross transplants were made in both directions.

Wild-type eyes transplanted on vermilion-eyed individuals remained unchanged in their new environment. But vermilion eyes transplanted on wild-type individuals assumed the wild-type eye color: the new environment, genetically dominant, overcame and changed their vermilion color, which is a recessive Mendelian character.

Science News Letter, September 7, 1935

PHARMACOLOGY

Concentrated Vitamins Called Drugs, Not Foods

PURE vitamins made by the chemist and purchased at the drug store belong in the category of drugs rather than foods, declares Dr. C. D. Leake, professor of pharmacology at the University of California Medical School.

Dr. Leake warns against the danger of indiscriminate use of these new drug store vitamins. They should not be taken without the advice of a physician, he says.

Vitamin D, the rickets-preventing vitamin ordinarily obtained by the action of sunlight on the skin, or from that old standby cod liver oil, is now available to the public in highly concentrated form. Unless the pure chemical form of the vitamin is made with extreme care, however, it may have certain poisonous properties, Dr. Leake says. Consequently it should only be taken under the direction of a physician.

The same applies to cevitamic acid, the pure chemical form of anti-scurvy vitamin C found in citrus fruits and certain vegetables. Studies in the Pharmacological Laboratory of the University of California, by Dr. H. H. Anderson, B. H. Fisher and N. M. Phatak, show that if cevitamic acid is injected into the body as has been recommended, it may cause injury at the point of injection and it may also cause undesired blood changes. These effects may be prevented by proper chemical neutralization of the compound. While cevitamic acid, the pure chemical form of Vitamin C, is only available to physicians, great care is nevertheless necessary in its administration, Dr. Leake holds.

Science News Letter, September 7, 1935

ANTHROPOLOGY

Minnesota Man's Claim To Great Age Defended

MINNESOTA Man, a much-disputed skeleton of great but uncertain age, is defended as really ancient by Dr. Kirk Bryan, Harvard University geologist. (*Science*, Aug. 23).

Recently doubt was cast upon the skeleton's claim to great age by Dr. Ernst Antevs, noted Swedish geologist. He traced a route of migration by which America's first inhabitants might have entered this continent from Asia as much as twenty thousand years ago, but would admit no greater age for man in the Western Hemisphere.

The famous Minnesota skeleton had been found associated with earth strata known to be much more than twenty thousand years old. Dr. Antevs got around this difficulty by assuming that this ancient individual had been buried by a landslide.

Dr. Bryan has re-examined the locality where the Minnesota Man find was made. He calls attention first to the very gently rolling character of the country, not likely to produce landslides. Gullies do exist in the hills, he says, and they are sometimes filled up after they have formed. But there is no evidence that the disputed skeleton was found in such a refilled gully.

All the evidence he has been able to obtain, Dr. Bryan says, points to the presence of undisturbed, ancient layers of soil over the skeleton when it was first uncovered.

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BOTANY

California's "Orphan Plants" Once Grew on Island Chain

CALIFORNIA has a great wealth of endemics, or "orphan plants"—species found in limited areas in that state, and nowhere else in the world. There are over 5,000 species of higher plants in the state, of which about 2,000 represent these "orphans." As contrasted with the number of known species for the whole northeastern quarter of the United States, less than 3,500, this shows up sharply how varied the flora of California is.

A reason for this condition was offered before the meeting of the Sixth International Botanical Congress, by Prof. W. L. Jepson of the University of California. He called attention to the fact that most of these "orphan plants" grow on limited areas quite near the coast. Then he stated that every one of these "endemic patches," these "plant orphanages," had in past geologic time been an island.

Since the days when Darwin and Wallace popularized the idea of evolution, the role of island isolation in enabling new species to develop has been taken as an axiom among students of the life sciences. Here, then, Prof. Jepson pointed out, was an ideal situation for the development of large numbers of unique and solitary species of plants.

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PSYCHOLOGY

Hungry Rats Learn Faster, Psychologists Find

RATS, and presumably humans, learn faster when hungry. Experimental evidence for the effect of hunger contractions on learning in rats is reported by Dr. M. H. Elliott and W. C. Treat of the department of psychology at Harvard University. (*Proc. National Academy of Sciences*, August).

The rats in the study were given double stimulations of electric shock and light. They were supposed to learn to associate the light with the shock so that when the light alone was turned on, they would respond in the same way as if they felt the electric shock. Fasting rats having hunger contractions learned the correct response in about half as many trials as fasting rats given just enough food to stop the hunger contractions.

"The occurrence of hunger contractions favors learning," the investigators conclude.

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ZOOLOGY

Not "Stuffed"

New Preparation Methods Make Museum Groups Lifelike Sculptures of Actual Scenes in Far-Off Jungle Lands

By DR. FRANK THONE

"NO, CHILDREN; the dogs are stuffed, but the Eskimos aren't. They are just wax figures."

A passerby in the American Museum of Natural History in New York overheard this unconscious tribute to the realism of modern methods of preparing exhibits, as a schoolteacher tried to keep up with the questions of her young charges, marshalled in front of a case showing an Arctic hunting scene.

The kids were hardly to blame, at that. The things they see in a well-managed museum today would be able to fool more sophisticated eyes than theirs. We have come a long way, in taxidermy, from the "stuffed owl stage" known to our grandparents.

In "Stuffed Owl" Days

Then, a taxidermist took a skin, tanned it into some semblance of softness, sewed it together like a rag doll, and proceeded to ram into it wads of excelsior or other "stuffing" until it was bulged out to something like its original size. It did not matter if the legs and neck were stiff, if the whole thing looked rather bloated, if its attitude were that of a wooden Indian—or even a wooden bench. It was a stuffed animal, and you were supposed to admire it as a work of both science and art.

As a rule, too, this sad lump of excelsior in a lion's skin was thrust shamelessly into a glass case all by itself, without so much as a handful of dry sticks to cover its confusion. At times, the "professor" would condescend to put in an autumnal oak branch, covered with withered leaves; but this was by way of concession to a rather over-finicky public taste.

Time has brought changes—and improvements. Now a lion might well feel a sense of distinction in giving his skin to be used in a museum exhibit. Even an Eskimo might, when it comes to that. For the modern museum's display cases are the abodes of living pictures rather than pathetic sarcophagi of stiff-kneed death. The animal whose skin goes into one of them has achieved a kind of immortality, for it will stand there, poised as at a moment of climax-living, for years after its owner would have died a natural death.

The old-time museum exhibit was based on the false proverb that beauty is only skin-deep. Beauty is far deeper than that. True beauty, whether in a woman or a lioness, goes clear to the bones. Beauty is form even more than color or external texture; the skin is only beauty's container.

It is the realization of this correct philosophy of beauty that has wrought such a revolutionary improvement in museums during the past few years. Preparators now take meticulous pains to reproduce, on the mounts that are to display their skins, the exact form of the animal's lithe grace, its smooth waves of muscle, every vibrant detail that existed under its skin while it was still breathing and moving. The museum preparator is no longer an animal stuffer, he is an animal sculptor.

A visit to the preparation room of a large museum is a visit to an artist's studio. You will find the same materials, used in much the same way, by men with the same skill. The only difference is that in the end the artist's figures continue to stand in naked stone or bronze, while the museum man's figures are finally clothed in the natural skin.

The activities of the preparation room are only the last steps in a long process. The mounting of the animal really begins before the animal is dead. Collecting expeditions are no longer made up merely of hunters who kill their specimens, remove and salt the skins, and then lead their safari back to the coast. Along with the hunters now go photographers, artists, sculptors, botanists, who study and record the animal and his environment, having all notes, pictures and models ready before ever a rifle cracks. When an animal's skin goes down to the coast nowadays, a comprehensive sample of the animal's world goes with it, to be set up as an indispensable part of the final exhibit.

All this takes time, costs money—lots of both. When an expedition returns from the field nowadays, announcing through the press that "valuable specimens of rare animals have been secured," there are very apt to be visitors

LIONS IN ALL STAGES OF DEVELOPMENT

The small models are sculptors' guides in the preparation of full-sized manikins.

coming round within a week, demanding to see the new scientific treasures. But it may be anywhere from three months to three years before the job is complete. It takes much longer to set up a museum specimen properly than it does to secure the skin and bring it home, even from the heart of Africa.

In the home workroom, the setting up of the mounts for the skins, or "manikins" as they are called, follows the same routine as that used by any sculptor. When a big statue is to be made, the sculptor first makes a little model, and from this he enlarges his final work, sometimes through an additional intermediate stage.

It is here that the field sketches and models brought back by the expedition's artists render their service. These first copies are worked over in the preparation room, revised and refined, until they can pass the exacting criticism of both artist and zoologist.

Then the full-scale model is worked out, in modelling clay. Over this a hollow mold, in sections, is built up. Into the mold are fitted light foundations of wire mesh, to hold layer upon layer of papier-maché. When this is removed from the mold, an exact replica of the clay model has been obtained, light but strong. Fitted together, with wood and wire bracing inside, this is the mannikin. Over it the skin is stretched—and your lion, or antelope, or towering giraffe stands before you, "large as life and twice as natural."

Making the Jungle

In the meantime, the artists have been at work on the setting. The back-drop of the alcove into which the animal group is to be fitted is painted with the sky and distant mountains or vista of the endless horizon of the plains. As carefully as any artist painting a landscape for its own sake, to be hung in a great gallery, the painters work, while electricians and lighting experts develop the details of the illumination to be supplied from hidden lamps and reflectors.

Then the botanists and the plant modellers move up with the materials they have been preparing. They have brought pressed specimens and photographs and watercolors of native flowers, pieces of the trees and shrubs of the country, even bushels of earth and stones. In part, these original materials may be fitted into the growing home for the mounted animals, in part they are copied to exact color and texture out of synthetic materials. Sometimes several thousand leaves have to be made, by

IN THE HEART OF THE ASIAN JUNGLE?

Not at all: these tigers are "at home" in the American Museum of Natural History.

paintaking hand labor, for a single tree.

Finally, when all is ready, the animals are moved into their setting, the great plate glass front is sealed over them, and the exhibit is ready. As you stand in the semi-obscurity of the hall, looking into the brightly illuminated reproduction of the forest, you cannot break the illusion of coming upon a sunny spot where tigers are basking, or leopards snarling over a wild peacock they have killed. Involuntarily you cannot help tensing your muscles and getting ready to jump, if one of the beasts should move in your direction.

This procedure is followed for practically all animals that have hairy or woolly skins. The naked-hided animals, like the wrinkly elephants or the plated rhinoceroses, present a different problem. Here the skin is sometimes pressed on the model while it is still plastic, to give the outlines for the final shape.

Another trick of museum technique is the manipulation of a doughy kind of celluloid, colorable in any hues desired, to make such wet and glistening surfaces as the enormous blunt muzzle of a hippopotamus. The natural skin there would look unnatural; the innocent nature-faking is truer to nature.

Reconstruction of fossil animals, which no man ever saw in the flesh, calls for sculptural skill of a quite different order. Here, the job is not to fit flesh around the bones, but to get the bones out of the stony "matrix" in which they are usually embedded. Hour after hour, month after month, the patient chiselmen must work, always following the often indistinct boundary between fossilized bone and formless stone. They are not carving out something according to their imagination or a blueprinted pattern; they are having to carve true to a pattern always at the edge of the tool, which one false stroke might ruin.

Once they are out, the bones have to be fitted together—which is not at all an easy task, since most of them are always broken, many parts are missing, and often you cannot be sure that all the bones you have belonged to the same individual.

Once assembled, the skeleton may stand towering in its naked impressiveness, or the preparators may do one of their most effective stunts. They study the places where the muscles were once inserted on the bones, thereby achieving an estimate of how big they were and which way they ran. They build up these lost muscles out of modeling material, but only around one-half of the skeleton. A mount thus prepared looks like a whole animal when viewed from the starboard broadside, but from the port side you see the skeleton with the darkened silhouette of the body outline behind it.

The equipment of the museum workers includes not only the usual materials of the sculptor—clay, wax, plaster, papier-maché, etc.,—but also one which jewelers sometimes use: glass. At the American Museum of Natural History one of the most skillful glassblowers in the world, who with his father before him first worked in the widely known Tiffany establishment, keeps his blowpipe and shears busy modelling greatly magnified images of one-celled plants and animals and all the other

wonderful, complicated life you can see in a drop of water. Beads go for drops and bubbles, rods and tubing for strands of protoplasm, bristles and stalks. His work is so beautiful it leaves you gasping with incredulity.

Another device that has been tried with considerable success in both this country and Germany is the turning of small animals, like insects, lizards and small snakes, into models in wax by the basically simple process of slowly impregnating them with hot paraffin. While they are still warm they are bent and posed into the exact positions desired, and then the wax is permitted to chill and stiffen. After this, the surplus wax is gently scraped and brushed away. The animals are left with their natural colors and high glitter, which they would quickly lose if they were pickled in the traditional jars of alcohol or formalin solution. If they are not exposed to unreasonably high temperatures they will keep forever; paradoxical preparations, wax models, yet the real thing.

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PUBLIC HEALTH

Federal Survey of Chronic Illness to Start Oct. 15

FEDERAL study of chronic illness throughout the country is getting under way, and the house-to-house canvass in 19 states to collect information is scheduled to start Oct. 15.

The study will be directed by George St. J. Perrott, statistician of the U. S. Public Health Service. In his office workers are already busy preparing and revising charts, tables and forms for collecting data. However, the study, for which $3,450,000 was appropriated, is really a WPA project and 90 per cent. of the personnel will be taken from the work relief rolls of the various states.

In between looking at charts and giving suggestions to his assistants, Mr. Perrott explained the reason for this gigantic health inventory.

The front is changing in man's battle against disease. Part of this is due to the advances in science. Powerful weapons are at hand with which to hold in check if not actually to demolish such old foes as yellow fever, smallpox, diphtheria and the deficiency diseases like scurvy, rickets and pernicious anemia.

Part of the change in front results from the appearance and spread of relatively new diseases such as epidemic encephalitis, infantile paralysis, influenza and dental fluorosis.

Another reason for the change in front in the disease fight, and one likely to be of increased importance in the future, is the change in age of the population.

The American people are growing older. There are more middle-aged and older persons in the country and fewer children and young adults. This means that as a whole the population is outgrowing the childhood diseases and other ailments of an acute nature and becoming more prone to the chronic diseases which appear in middle life. Cancer, heart disease, rheumatism and disabilities resulting from industrial accidents and disease are becoming more important as health problems.

Far-sighted public health officials are alive to this changing front in disease warfare, and already are beginning preparations for the fight on these old foes whose importance is increasing year by year.

The first step, getting accurate knowledge of the enemy's strength and position, is now being taken in the WPA project directed by the U. S. Public Health Service. A gigantic health inventory of the country is to be made. This will tell how many people in America suffer from chronic illness or physical disability; the geographic distribution of such illness; how much time is lost from work as a result of these conditions; and how these illnesses and disabilities affect the capacity of the patient and his family to remain self-supporting.

Some of the information will be obtained from records of hospitals and sick benefit associations. The rest will come from the house-to-house canvasses of 750,000 families selected to be representative of the general population of various income levels. Besides chronic illness, data will be collected on physical disability, such as blindness, deafness and loss of limbs or other crippling.

The U. S. Public Health Service has already been making an intensive study of the importance and effect of chronic ailments on the capacity of the patient and family to remain self-supporting. The new health inventory will be correlated with this study so as to obtain further data on this phase of the chronic illness problem.

From the knowledge thus acquired the federal health officials hope to attain a strategic position for a successful fight against disease at the new front.

The states selected for the inventory are Washington, Oregon, California, Utah, Minnesota, Missouri, Illinois, Michigan, Ohio, Pennsylvania, Maryland, Virginia, New York, New Jersey, Massachusetts, Georgia, Alabama, Louisiana and Texas.

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MUNITIONS MAKERS

Preparing ammunition for the welfare of medical science against disease, two laboratory workers dissect the spinal cord of a Rhesus monkey from which infantile paralysis vaccine is prepared. The operation is performed after the animal has been killed painlessly and must be carried out under sterile conditions.

PLANT PATHOLOGY

Dutch Elm Disease Found In Indiana and Virginia

DUTCH elm disease is still a potential menace outside the zone around New York City where the major eradication efforts have to be concentrated because of the gravity of the infestation there. Two isolated outbreaks, one of nine infected trees in Indianapolis, Ind., the other of two trees in Norfolk, Va., have been reported to the U. S. Department of Agriculture. These trees have been destroyed, and scouts are hunting in their

respective neighborhoods for others that may still be bearing the disease.

The scouting and eradication campaign conducted by the Bureau of Entomology and Plant Quarantine, U. S. Department of Agriculture, has now reached impressive proportions. In the infested area, covering parts of Connecticut, New York and New Jersey a total of over 1700 square miles has been scouted to date, and specimens from more than 30,000 suspected trees have been collected and sent in to the laboratories for examination. About a third of these have received positive identification and the trees have been destroyed.

In all this work, the Federal forces are receiving full aid and cooperation from state and local authorities.

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CHEMISTRY

Increase in Research Projects Hints Economic Gains

INCREASING magnitude of chemical research is the latest sign pointing to improved economic conditions, Prof. E. J. Crane of Ohio State University, head of the American Chemical Society's international reporting system, announced that during the first six months of 1935 the number of research projects completed was ten per cent. greater than in the first half of 1934. Abstracts of chemical reports from all parts of the world totalled 20,342 this year, as compared to 18,664 during the first six months last year. A staff of 400 men scattered over the globe is required to keep the abstracts of chemical research up to date.

According to the latest figures available to the Society's committee on unemployment there are some 931 trained chemists without employment at the present time, and an additional 683 who have been driven out of the chemical work into other fields. This situation is not believed to be hopeless, despite the fact that the number of chemists was augmented by 5,800 college graduates during the years 1933 and 1934. It is the committee's belief that the major unemployment difficulty is among chemists over thirty-five years of age whose places are being taken by younger men.

Kansas City, Mo., will be the scene of the Society's ninety-first meeting in the spring of 1936, and Pittsburgh will welcome it for the ninety-second meeting in the fall of 1936. The spring and fall meetings of 1937 will be held in Chapel Hill, N. C., and Rochester, N. Y., respectively.

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GENERAL SCIENCE

Government Aid Demanded For Research in Pure Science

THE UNITED STATES Government, because of its failure to recognize the importance of sponsoring theoretical scientific research, is in danger of losing out in the race for fundamental discoveries upon which the future progress of the nation, industrially and otherwise, must depend.

A warning to this effect was issued recently by Dr. Roger Adams, President of the American Chemical Society in his presidential address before that organization's ninetieth meeting at San Francisco.

Dr. Adams said, in part: "Active participation of industry in the development of a national program of pure science to assure continued industrial progress is demanded, and the government should be a leader in this movement. The federal government, although it spends a staggering amount of money each year for applied research, at no time has shown a proper respect for research in pure science, even in its own bureaus."

To indicate the importance of theoretical research, Dr. Adams said: "The basic and fundamental information for over ninety-five per cent. of our industrial processes has been originally discovered and described by university investigators in pure science."

Among countless examples he cited the development of the dye and aluminum industries, and the production of ammonia, X-rays, insulin, procaine and other anesthetics, war gases, rare gases such as helium for balloons or dirigibles and neon for illuminated signs, tantalum, an inexpensive substitute for platinum, and other substances such as titanium, tellurium, and gallium.

Among recent discoveries in pure science which are not yet but will some day be of importance to industry, he referred to heavy hydrogen and heavy water, and the many facts now being learned about the structure of atoms.

In conclusion he asked: "Is it not time to recognize the handicaps under which our scientific research in the United States has been accomplished and to seek the factors contributing to the improvement of pure science so it may be on a par with applied science?"

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ENGINEERING

Thin Aluminum Foil Highly Efficient as Heat Insulator

THIN aluminum foil is found to be a highly efficient heat insulator in experiments being conducted in the torrid heat of Egypt, where tests include the metal for use in tropical helmets, the linings of tents and corrugated iron buildings.

Dr. G. P. Crowden of the London School of Hygiene and Tropical Medicine reports his Egyptian tests (*Bulletin of Hygiene*, April).

Laboratory experiments showed that a single such diaphragm of aluminum foil medially placed in an inclosed one-inch air space has the heat-insulating value equivalent to that of one inch of cork. In practical experiments conducted in corrugated iron buildings in Egypt, the temperature on the inner surface of a 3-ply lining was 12 degrees Fahrenheit lower than that on the inner surface of the corrugated iron; while in a similar building which was provided with metallic insulation of aluminum foil in addition to the 3-ply lining, the temperature of the inner lining surface was 23 degrees Fahrenheit lower than that of the inner surface of the corrugated iron, and the air temperature of the latter building was 3.6 degrees Fahrenheit lower than that of the first.

Interesting results have also been obtained with the use of aluminum foil as a lining for tropical helmets. Laboratory experiments showed that the temperature inside a helmet lined with the foil was as much as 20 degrees Fahrenheit lower than in an otherwise similar helmet but having the usual fabric lining.

Dr. Crowden also emphasizes the value of reinforced aluminum foil for use in lining tents in hot countries. Field ex-

periments conducted in England during the hot summer weather demonstrated the remarkable efficiency of this method of increasing the comfort of those housed under canvas. This method has also been used for the insulation of food stores, with efficiency and economy, and aboard ships for the insulation of corridors and apartments in the vicinity of funnels.

In fact, it appears that reinforced aluminum foil can be used for insulation against heat or cold in a wide variety of ways, and this material has the advantages of being durable, cheap, easy to apply, and light in weight.

Science News Letter, September 7, 1935

CHEMISTRY

Chemist Sees Eventual Profit In Gold From Sea Water

A "MILESTONE" in the path leading to the commercial extraction of gold from sea water was the opinion of Thomas Midgley, Jr., chemist and vice-president of the Ethyl Gasoline Corporation, regarding the report of the new gold extraction process announced by Dr. William E. Caldwell of Oregon State College at the recent meeting of the American Chemical Society. Mr. Midgley said:

"Despite Dr. Caldwell's modesty in depreciating the advance that he has made in extracting gold from sea water, it is my opinion that this is one of the milestones on the path to progress that eventually will lead to the commercial extraction of gold from sea water.

"Less than two years have passed since I made the statement at the American Chemical Society meeting in St. Petersburg, Fla., when the announcement was made that bromine was being commercially extracted from the sea for use in ethyl gasoline, that 'it is no more impossible to extract gold from sea water now than it was to extract bromine from sea water ten years ago.' The work of Dr. Caldwell and the recently announced proposal of Dr. Colin G. Fink of Columbia University to extract gold by electroplating it upon the propellers of ships carry science forward to its goal."

Science News Letter, September 7, 1935

CHEMISTRY

Government Chemist Less Optimistic on Ocean Gold

By DR. EDWARD WICHERS
Chemist, National Bureau of Standards

RECENT articles in scientific journals and in the public press indicate that speculation about the economic recovery of gold from the sea is again to the fore. The published reports, however, make one suspect that important evidence on the actual content of gold in ocean water is being overlooked or ignored. Of the numerous scientific investigations on this subject, the most thorough and comprehensive work is undoubtedly that of the late Prof. Fritz Haber and his associates, published in Germany in 1925 and 1927.

Before this work was done, the weight of the evidence seemed to indicate that ocean water contained 5 to 10 milligrams of gold per ton (5 to 10 parts per billion). Although it would be necessary, on this basis, to treat 1 to 2 tons of water to get 1 cent's worth of gold (at $35 per ounce), a process was developed by Haber which was thought to be capable of profitable operation. In fact, the work was undertaken with the hope that the inexhaustible supply of gold in the sea and in the Rhine might be used to rescue Germany from its post-war economic collapse.

Much to the surprise of Haber and his associates, their results showed that the average content of gold in the Atlantic Ocean is only 0.008 milligram per ton (about one-thousandth as much as previously supposed), that water from a certain part of San Francisco Bay contains about twice that amount, water from polar regions perhaps 5 or 6 times as much, and that an occasional sample of glacial ice, carrying detritus scoured from rocks, may contain a few milligrams of gold per ton.

[Editor's note: Recent technical articles and statements in the press by L. C. Stewart, W. H. Dow and Prof. C. G. Fink state that gold occurs in sea water of the Atlantic Ocean in concentrations of 2.3 parts per billion.]

The difference between current estimates of 2.3 parts per billion and the value found by Haber, which amounts to a ratio of 300 to 1, largely determines whether the economic recovery of gold from the seas is almost within reach or must remain a will-o'-the-wisp. Of course, no one can be dead sure that Haber's estimate is the correct one. On the other hand, there is no published work on this subject which can begin to compare with that of Haber and his associates (at least ten in number). Carried on, as it was, over a period of years, involving the assay of over 5000 samples, with the most minute attention to every conceivable source of error, stimulated by the glamorous hope that Germany might be financially redeemed, and directed by a thoroughly dependable scientific mind, this work may well be regarded as a classic of chemical research.

It would be well for all who concern themselves with this subject to refrain from further public speculation about it unless they are able either to successfully refute Haber's conclusions, or to show that the economic recovery of gold from water containing 1 part in 50-100 billions is even within the shadow of reason.

Since much of the recent speculation on the subject has been related to the Dow Company's bromine plant, a few calculations based on Haber's estimate of

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the content of gold in the Atlantic, and on data prepared by Stewart, might be illuminating. According to Stewart, the plant produces some 15,000 pounds of bromine per day, which is worth, at the currently quoted price, about $5,000. If the plant were operated at the full stated capacity of the two intake pumps, and the metal were completely recovered, the yield of gold per day would be slightly less than 30 cents, a figure whose significance in colloquial usage should not be overlooked.

If Haber's estimate is correct, an economic process for the recovery of gold must be capable of handling and treating not less than 1000 tons (240,000 gallons) of average ocean water to get 1 cent's worth of gold. Although the process devised by Haber was extraordinarily simple and cheap, in principle similar to the purification of public water supplies, the water required a head of 12 feet to flow through the filter at a suitable rate. If such a process were operated on the basis of producing one ounce, or $35 worth, of gold per day (assuming quantitative recovery) the cost of power, at the rate of 0.2 cent per kilowatt hour, needed to lift the necessary quantity of water from the level of the sea to a height of 12 feet, would be perhaps 3 times the value of the gold recovered. This is only the cost of the power to pump the water, without regard to the much larger costs of plant, labor, and chemicals. Even some "free" source of power, such as that provided by tides, could in all probability be used to generate electrical energy worth several times as much as the gold which would be recovered from a hypothetical plant using the same quantity of power.

Science News Letter, September 7, 1935

In some coal mines of Illinois and Indiana, dynamite blasting has been discarded in favor of compressed air which releases the coal in larger and more valuable chunks.

PHYSIOLOGY

NATURE RAMBLINGS
by Frank Thone

More Water Than Dust

MORALISTS of the old school were very fond of reminding man of his earthy origin, constantly quoting the admonition of Genesis: "Dust thou art, and unto dust thou shalt return."

As a matter of quantitatively measurable fact, however, man and all other living things are far more water than they are dust. When they perish, only a little of them goes back to the dust of the earth; the greater part evaporates into thin air.

Anyone who has ever had the sorrowful task of attending to the disposal of the remains of a deceased friend who specified cremation rather than burial will recall how little is left at the end of the process. These ashes, or "dust," that represent all that was really solid of a full-grown man, hardly make a double handful.

What becomes of all the rest? Mostly water, evaporated away. The blood fluids alone account for something like three gallons, or between 25 and 30 pounds. The muscles, fat and other soft tissues will yield something like 75 per cent. of their weight in water. The marrow in the bones, and the very bones themselves, ooze water.

But even if you were dried out to a mummy, as desiccated as the late King Tut after 3,000 years in dry storage, there would still be water to extract before you were reduced to the final "dust." For "this too, too, solid flesh" can melt and resolve itself in dew, even as Hamlet wished it might.

Muscle and fat, glands, connective tissue and nerves, are composed mainly of two types of chemical compounds: hydrocarbons and proteins. The hydrocarbons are combinations of hydrogen and carbon and oxygen in varying proportions. The proteins contain the same elements, plus nitrogen and a trifling amount of sulfur.

When either of these compounds is heated to the point where their structure breaks down, there occurs what chemists call "destructive distillation." To a considerable extent, each oxygen atom pairs off (or rather "triples off," for oxygen is a bigamist) with two hydrogen atoms, to form water. Oxygen from the air comes in and picks up the carbon atoms and the excess hydrogen, forming carbon dioxide and more water. Most of even the dried mummy vanishes as vapor, leaving only the pint or so of solid mineral remains as ashes or "dust."

Chemically speaking, therefore, man is not dust. Man is mostly gas and water.

Science News Letter, September 7, 1935

Iron-mining activity has given Sweden a polar city of 11,000 inhabitants, at Kiruna.

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•First Glances at New Books

Agriculture

YEARBOOK OF AGRICULTURE 1935—Edited by Milton S. Eisenhower and Arthur P. Chew—*Govt. Printing Office,* 762 p., $1. The record of another year's progress in American agriculture, comprising discussions of events and advances in the fields of agricultural economies, life sciences, agronomy, domestic science and all the multitudinous spots where scientific method and life on the land are in contact.

Science News Letter, September 7, 1935

Conservation

GOVERNMENTAL PROBLEMS IN WILD LIFE CONSERVATION—Robert H. Connery—*Columbia Univ.,* 250 p., $3.25. With a new era beginning (or at least so it is to be hoped) in official and public attitudes toward wildlife, its use, care, and conservation, this publication assumes real importance. It discusses in considerable detail and with admirable objectivity the respective roles of Federal and State governments, the fields of operation of the Biological Survey, the Bureau of Fisheries and other agencies, game laws and their administration, and other pertinent subjects.

Science News Letter, September 7, 1935

Botany—Pharmacy

THE FLORA OF A CANTON HERB SHOP—F. A. McClure and Hwang Ts'ui-mae — *Lingnan Univ., Canton, China,* 32 p., $.50 Mexican. Lingnan Univ. Science Bull. No. 6. An interesting excursion into the native Chinese pharmacopoeia. Latin and Chinese names of each herb are given, together with a brief note on their respective medical uses.

Science News Letter, September 7, 1935

Seismology

UNITED STATES EARTHQUAKES, 1933—Frank Neumann—*Government Printing Office,* 83 p., 10c. Detailed information on all earthquakes in the United States and regions under its jurisdiction during the calendar year 1933.

Science News Letter, September 7, 1935

Marine Biology

WEST COAST SHELLS—Josiah Keep—*Stanford Univ. Press,* 350 p., $3.75. If you live on the Pacific coast, or go there for a vacation, you can hardly have a better hobby (and it may become a serious one, too) than collecting shells on the seashore. This book makes it easy to put your pastime on a scientifically satisfactory basis. Published first in 1881, it has passed through a number of revisions, the present working-over being by Joshua L. Baily, Jr.

Science News Letter, September 7, 1935

Medicine

1000 QUESTIONS AND ANSWERS ON T. B. —Ed. by Fred H. Heise—*Journal of Outdoor Life,* 232 p., 75c. The thousand questions most frequently asked by tuberculous patients or their relatives in Dr. Heise's long experience of answering such questions are presented in this small volume. The answers are simple, concise and reliable. The book should be very helpful, especially as it is well indexed.

Science News Letter, September 7, 1935

Public Health

KEY-CATALOGUE OF PARASITES REPORTED FOR CARNIVORA (CATS, DOGS, BEARS, ETC.) WITH THEIR POSSIBLE PUBLIC HEALTH IMPORTANCE, (NATIONAL INSTITUTE OF HEALTH BULLETIN NO. 163)—C. W. Stiles and Clara Edith Baker—*Govt. Printing Office,* 310 p., 20c. Considering the number of parasites our pets harbor, the fact that many of them are transferable to ourselves, and the further fact that many of them are disease vectors, this official publication assumes a really considerable importance from the medical and public-health points of view.

Science News Letter, September 7, 1935

Botany

THE NORTH AMERICAN SPECIES OF SPHAERALCEA, SUBGENUS EUSPHAERALCEA—Thomas H. Kearney—*Univ. of Calif.,* 102 p., 12 pl., $1.50.

Science News Letter, September 7, 1935

Paleontology

A REVIEW OF THE TERTIARY BEAVERS—R. A. Stirton—*Univ. of Calif.,* 67 p., $1.

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History of Science

A HISTORY OF SCIENCE, TECHNOLOGY, AND PHILOSOPHY IN THE 16TH AND 17TH CENTURIES—A. Wolf—*Macmillan,* 692 p., 316 illustrations, $7. A monumental volume, covering in great detail and with profuse illustrations one of the most important and fruitful periods of scientific development. It will be an important and necessary part of any library that undertakes to cover adequately the history of science, and it is also capable of being read by those who appreciate serious entertainment.

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Natural Science

STUDIES IN THE LITERATURE OF NATURAL SCIENCE—Julian M. Drachman—*Macmillan,* 487 p., $4. Great scientific works are not infrequently able to stand the test for literary quality also. This book examines a number of the greatest of them, in the royal line of Lamarck, Darwin, Tyndall, Faraday and their kin. It should be read by all scientists who are well enough educated to see their science as culture.

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Eugenics

GENETICS AND THE SOCIAL ORDER—Mark Graubard—*Tomorrow Publishers,* 127 p., paper, 50c., cloth, 75c. Compact popular exposition of the principles of genetics, passing over into eugenical discussion with avowedly Marxian dialectic angle.

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Botany

NEW OR LITTLE KNOWN WEST AMERICAN WILLOWS—Carleton R. Ball—*Univ. of Calif.,* 18 p., 7 pl., 60c.

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Botany

THE CHROMOSOMES AND RELATIONSHIP OF CREPIS SYRIACA (BORNM)—Donald Ross Cameron—*Univ. of Calif.,* 24 p., 50c.; Part II: THE RELATIONSHIP OF ONE HUNDRED EIGHT SPECIES—Ernest B. Babcock and Donald R. Cameron—*Univ. of Calif.,* 37 p., 50c.

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